WHAT IS CLAIMED IS:

1. A method for a multi-level loopback test wherein a loopback test device is installed between an Ethernet switch in a community and a community network system in a central office so that during the loopback test on the community

5   network system in the central office, the loopback test device is operated by the network management system to perform the steps of:

(a) in a first level of the loopback test, commanding the network management system to issue at least one special BPDU (Bridge Protocol Data Unit) packet wherein it is determined whether a reply packet has been received

10   from the loopback test device within a predetermined period of time, if yes and it is determined whether information contained in the reply packet shows that an I/O port of the loopback test device is normally coupled to an Ethernet switch in the community, and if the reply packet has not been received from the loopback test device within the predetermined period of time, it means that there is a

15   disconnection between the network management system in the central office and the loopback test device; and

(b) in a second level of the loopback test, the network management system in the central office issuing at least one special BPDU packet wherein it is determined whether all of the packets sent to the I/O port from the network

20   management system in the central office are sent back to the network management system in the central office without having any change, if yes, it means that there is a disconnection between the loopback test device and the Ethernet switch in the community or the Ethernet switch in the community is faulty, and otherwise if not all of the packets sent to the I/O port from the network

25   management system in the central office are sent back to the network management system in the central office, it means that the loopback test device is faulty.

2.   The method of claim 1, wherein in step (a) of the first level of the loopback test when the network management system has received the reply packet from the loopback test device within the predetermined period of time, in response it is determined whether information contained in the reply packet shows that the I/O port is normally coupled to the Ethernet switch in the community, if yes, it means that the first level of the loopback test is a success, and in response a third level of the loopback test is performed wherein the network management system in the central office issues at least one Ping instruction and determines whether there is a reply from the Ethernet switch in the community within the predetermined period of time, if yes, it means that the community network system operates normally, and otherwise, it means that there is a software fail in the Ethernet switch.

3.   The method of claim 1, wherein in step (a) of the first level of the loopback test it is determined whether there is a hardware fail between the network management system in the central office and the loopback test device or between the network management system in the central office and the Ethernet switch wherein the network management system issues at least one special BPDU packet, when an Ethernet control circuit of the loopback test device receives at least one special BPDU packet, the Ethernet control circuit will send the same to a packet transmission and receiving control circuit, and in response, the packet transmission and receiving control circuit changes a source address of the BPDU packet into a specific source address which is in turn sent back to the network management system in the central office via the Ethernet control circuit.

4.   The method of claim 1, wherein in step (a) of the first level of the loopback test the reply packet is filled with status information of the I/O port coupled to the Ethernet switch so that the network management system in the central office is

capable of determining whether a communication line is faulty or not after the reply packet has been received and determining whether the I/O port is normally coupled to the Ethernet switch in the community.

5.   The method of claim 1, wherein in step (b) of the second level of the loopback test it is determined whether there is a fail between the loopback test device and the Ethernet switch in the community wherein the network management system issues at least one special BPDU packet, when the Ethernet control circuit of the loopback test device receives a special BPDU packet for enabling a loopback test mode, the packet transmission and receiving control circuit will command the Ethernet control circuit to enable the I/O port coupled to the Ethernet switch in the community enter into the loopback test mode so that all of the packets sent to the I/O port from the network management system in the central office are sent back to the network management system in the central office without any change, resulting in a completion of the loopback test.

6.   The method of claim 5, wherein after the completion of the loopback test, the network management system in the central office will issue at least one special BPDU packet for finishing the loopback test mode wherein when the Ethernet control circuit of the loopback test device receives the special BPDU packet, the packet transmission and receiving control circuit of the loopback test device will command the Ethernet control circuit to enable the I/O port coupled to the Ethernet switch in the community enter into a normal mode.

7.   An apparatus for a multi-level loopback test installed between an Ethernet switch in a community and a community network system in a central office, the apparatus comprising:

    at least two I/O ports;

    an Ethernet control circuit having one end coupled to the Ethernet switch in

the community via one I/O port and the other end coupled to the central office via the other I/O port so that the Ethernet control circuit is operative to cause the I/O ports to operate normally and control a conversion or buffer in a full or half duplex mode; and

5 a packet transmission and receiving control circuit formed of an integrated circuit for performing a loopback test, a packet generation, and a packet reply, the packet transmission and receiving control circuit being coupled to the Ethernet control circuit;

wherein a network management system in the central office performs the
10 loopback test on the community network system, when the Ethernet control circuit receives at least one special BPDU packet sent from the network management system, the Ethernet control circuit will send the same to the packet transmission and receiving control circuit, and in response, the packet transmission and receiving control circuit changes a source address of the
15 BPDU packet into a specific source address which is in turn sent back to the network management system in the central office via the Ethernet control circuit so that the network management system in the central office is capable of determining whether a communication line is faulty or not and determining whether the I/O port is normally coupled to the Ethernet switch in the community.

20 8. The apparatus of claim 7, wherein after the Ethernet control circuit has received a special BPDU packet from the network management system for enabling a loopback test mode, the packet transmission and receiving control circuit will command the Ethernet control circuit to force the I/O port coupled to the Ethernet switch in the community into the loopback test mode so that all of
25 the packets sent to the I/O port from the network management system in the central office are sent back to the network management system in the central office without having any change, resulting in a completion of the loopback test.

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9. The apparatus of claim 8, wherein after the completion of the loopback test when the Ethernet control circuit receives a special BPDU packet issued from the network management system for finishing the loopback test mode, the packet transmission and receiving control circuit will command the Ethernet control circuit to enable the I/O port coupled to the Ethernet switch in the community enter into a normal mode.